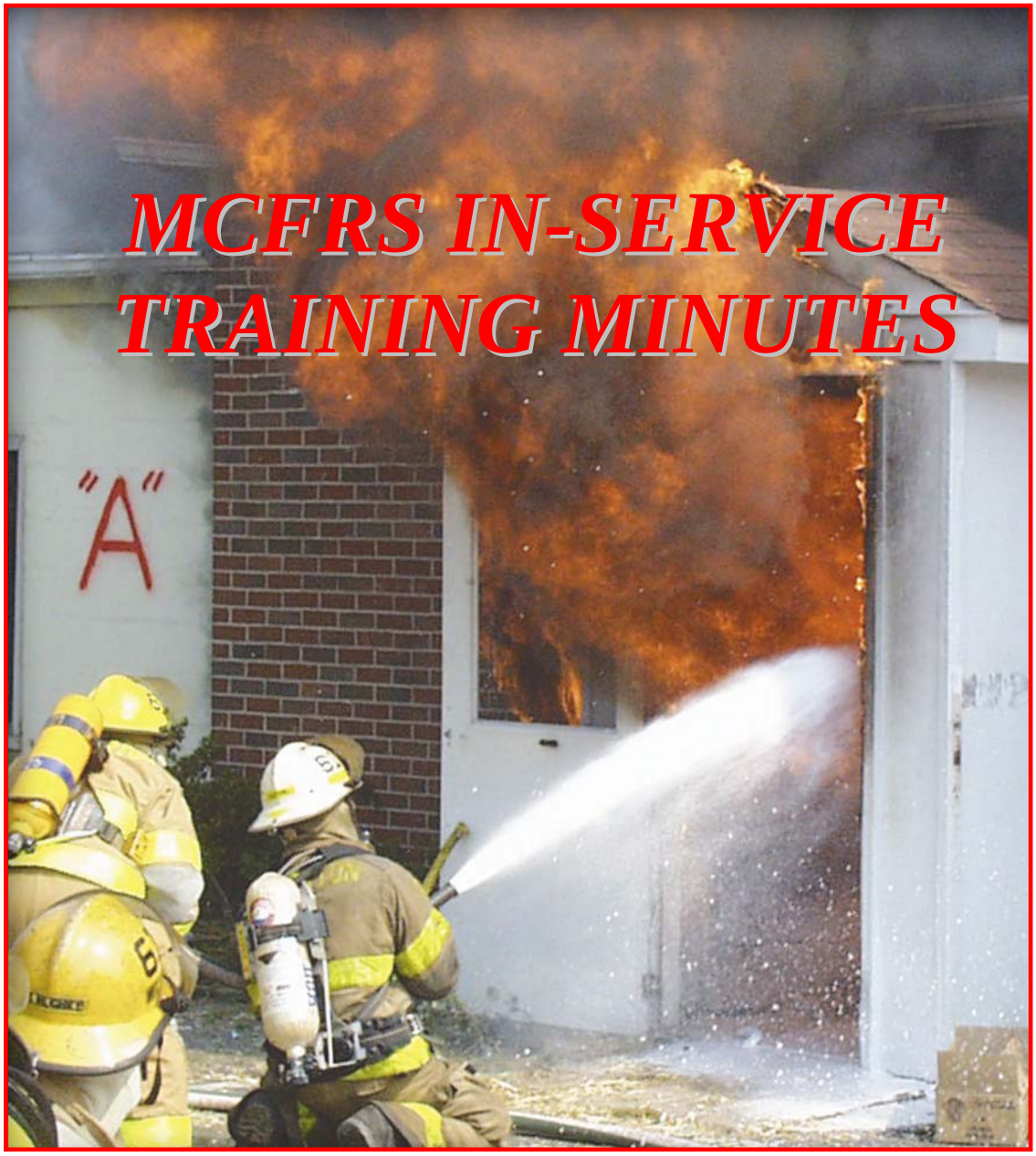

CLASS A FOAM
AND
CAF SYSTEMS

As noted earlier in September by Chief Tom Carr, our department will soon be adopting single stage pumps in combination with CAFS and Class-A foam solution technology designed for the new engines currently in

procurement. A/C Steve Lohr and numerous others have painstakingly worked to bring us the best possible product available. As our department transitions into this new era, the Apparatus Division in conjunction with the Training Academy will work to provide personnel with the training necessary to successfully operate these units.

As some of us are not very familiar with compressed air foam systems, it should be noted that they have been in existence for decades. In Europe during the 1930s, they were used for shipboard suppression and in the 1940s and 1950s they were used by the United States and British military for flammable liquids fires. By the late 1970s, Compressed air foam systems made their resurgence in the fire service by the Texas Forestry Service to combat large range fires. MCFRS has been researching this technology aggressively for over six years, including many live burns in a variety of settings.

Dominic Colletti, Sr. (not to be confused with his son, F/F Dominic Colletti, Jr. assigned at MCFRS FS6C), is the Global Foam Systems Product Manager for Hale Products, Inc. and author of The Compressed Air Foam Systems Handbook. He is a respected national authority on the subject and believes that some of the key benefits of CAFS and class A foam relate to:

1. **Lighter hose lines. Hose lines filled with compressed air foam are 30% lighter by volume.**
2. **Reduced water use. Total water supply in extinguishing a given fire is reduced by 1/3 of total water use in some instances.**
3. **Less chance for flashover. Compressed air foam rapidly absorbs heat from burning gases while keeping moisture within the bubbles in direct contact with solid fuels.**
4. **Reduces smoke and steam. The application of foam preserves the thermal balance and leaves minimal smoke and steam in the atmosphere. Firefighters are not driven to the floor by moisture clouds.**
5. **Increased reach. Compressed air foam streams, when used with the appropriate nozzle, have greater reach than water or nozzle aspirated foam fire streams. This provides greater penetration and an increased margin of safety.**

Class-A foam clings well to vertical and horizontal Class-A fuel surfaces and absorbs heat rapidly. Because the majority of a wet-finished foam blanket is 99.5% water (if a Class-A foam concentrate proportioning ratio of 0.5% is used), ordinary combustibles cool rapidly. This retards and eventually eliminates pyrolysis, the solid fuel to vapor conversion process that allows combustion to occur. With rapid fuel cooling, flames lose the vapor needed to support combustion.

In its simplest form, a CAFS consist of three pumps:

- **A plain water fire pump**
- **A foam concentrate pump**
- **An air pump (air compressor)**

The CAFS combines all three agents (water, foam concentrate, and air) in the proper proportions to produce the end result, a homogenized (blended) product ready for direct application. An air aspirating nozzle is not required with a CAFS because the mechanical agitation takes place at the fire pump. CAFS can supply designated discharges with foam solution (water and foam concentrate), or compressed air foam(water, foam concentrate and air). It is not recommended that compressed air foam be supplied into and through a non-CAFS attack centrifugal pump or through a non-CAFS quint aerial device (centrifugal pumps are designed to move water, not air or foam).

Today's on-board foam proportioning systems can generate finished foam in three primary consistencies:

- **"wet" foam which is good for interior attack**
- **"fluid" foam which is used for a variety of firefighting applications**
- **"dry" foam which is used primarily for exposure protection**

The primary difference among the three foam types is the amount of moisture contained within the foam blankets and their drain time, or the relative "strength" of the foam blanket. For example, dry foam has low moisture content, is stiff, and has a longer drain time compared to wet foam, whereas wet foam contains more moisture and drains rapidly.

When delivering compressed air foam, the correct proportion of foam concentrate is critical. When air is injected into a water stream absent of foam concentrate, a condition called "slug flow" may result in aggressive hose

pulsations. "Chatter" is another condition where insufficient foam concentrate is being injected. These conditions have been all but eliminated with the latest generation CAFS. Hose handling characteristics of high-energy CAFS lines require additional training and understanding for crews to be safe and effective.

Although lightweight and easier to maneuver, CAFS lines actually store the energy produced by the air compressor. When opened and the stored energy is released, substantial nozzle reaction can be expected. This phenomenon was more prevalent with the first generation CAFS; current technology has worked to reduce this circumstance. Crews still need to be prepared for this force. Additionally, just like plain water, kinking of a CAFS line will certainly change both foam quality and flow rate and may produce "slug flow" as outlined above.

WHAT SHOULD A NOZZLEMAN EXPECT USING AN ATTACK LINE SUPPLIED BY A CAFS PUMPER WITH CLASS A FOAM?

1. **Increased initial nozzle reaction upon opening the bale of the nozzle. The bale must be opened slowly to relieve stored air pressure. Once there is a steady flow from the hose line, nozzle reaction is significantly reduced. I personally operated a CAFS attack line with a pistol grip smooth bore nozzle with one hand while flowing finished class A foam.**
2. **Increased maneuverability due to less weight of the charged hose line. Don't be fooled, two people running the line is still a challenge. Certainly any small advantage can help.**
3. **Rapid heat reduction once the fire has been darkened down. At a CAFS demonstration in Clarksburg two years ago, members of MCFRS including myself were impressed by this phenomenon the most.**
4. **When using Class-A foam, you may have your face piece obscured slightly by the product during application. The wipe of a gloved hand will remedy this immediately.**

WHAT SHOULD A PUMP OPERATOR EXPECT AT THE PUMP PANEL OF A CAFS PUMPER?

1. **Placing your units into pump gear will primarily be the same. The Hale *CAFSPro* and *FoamLogix* systems are user friendly and will add two additional steps to the pumping process. CAFS will automatically turn on when the pump is engaged.**
2. **There will be designated discharges for foam operations (5 CAFS and 3 Foam Solution). When switching from CAFS to plain water operations on these discharges, the foam proportioner and air compressor will have to be disengaged.**
3. **You will have the ability to control compressed air foam consistency based upon the objectives of the attack; "wet" foam for an interior attack or "dry" foam for exposure protection.**
4. **The air compressor will require routine maintenance and inspection; compressor oil levels must be checked as well as the cooling line strainers.**
5. **The foam pump will require monthly strainer cleaning.**
6. **Discharge pressures will be predetermined for pre-connected class A foam lines. Typically, they will be between 90-110 psi based upon the nozzle and hose diameter compliment. The Apparatus Division will set the recommended parameters for discharge pressures to achieve "critical fire flow" with CAFS and Class-A foam.**

The use of compressed air foam systems in conjunction with Class-A foam will be a substantial change in philosophy for our department. Over past decades, fire departments world-wide including Montgomery County have experienced progressive change in a number of ways:

- **Equipment**
- **Communications**
- **Tactics**
- **Command structure**

Compressed air foam systems are another example of that sweeping change that will prove to benefit us all with time and training.

One major goal Chief Carr has established for himself is to provide our department with modern technology, leadership, and training that will maximize our firefighting efforts. By doing so, we continue to ensure the protection and well being of the general public in the highest capacity while, *most importantly*, guaranteeing the safety of our own.

Class-A foam and CAFS are another extinguishing agent with a different method of delivery; another tool for the toolbox. Whether using water to extinguish a fire or Class-A foam, it is important for us all to remember that it still takes firefighters with courage, training, and tenacity to go in and "put the fire out."

GET READY BECAUSE THE CAFS ARE COMING!

Sources: **The Compressed Air Foam Systems Handbook, Colletti, Dominic**
Hale CAFSPro System User Operation Training Manual, Hale Products, Inc.
Pictures: **Dominic Colletti**

KEEP IT SAFE!

"DEDICATION TO EDUCATION"